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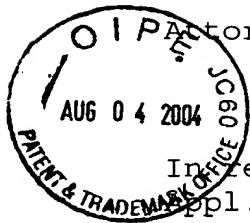
Attorney's Docket No.   034691/234885   PATENT

In The United States Patent And Trademark Office

In re: Beyerer et al.   Confirmation No.: 3478
Appl. No.: 09/868,716   Group Art Unit: 2878
Filed: June 20, 2001   Examiner: S. K. Yam
For: METHOD AND DEVICE FOR OBJECT RECOGNITION

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF TRANSMITTAL
(PATENT APPLICATION – 37 C.F.R. § 1.192)

1.   Transmitted herewith, in **triplicate**, is the APPEAL BRIEF
     in this application, with respect to the Notice of Appeal
     filed on June 4, 2004.

2.   ☒   Applicant claims small entity status.

3.   Pursuant to 37 C.F.R. § 1.17(c), the fee for filing the
     Appeal Brief is:
     ☒   small entity $165.00
     ☐   other than small entity $330.00
                         Appeal Brief fee due $165.00

     ☒   Any additional fee or refund may be charged to
          Deposit Account 16-0605.

                              Respectfully submitted,

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<div style="text-align:center"><u>APPEAL BRIEF UNDER 37 CFR § 1.192</u></div>

This Appeal Brief is filed pursuant to the "Notice of
Appeal to the Board of Patent Appeals and Interferences" filed
June 4, 2004.

1.   *Real Party in Interest.*

The real party in interest in this appeal is Hottinger
Maschinenbau GmbH of Mannheim, Germany, the assignee of the
above-referenced patent application.

2.   *Related Appeals and Interferences.*

There are no related appeals and/or interferences
involving this application or its subject matter.

3.   *Status of Claims.*

Claims 1-29, 35, 41, 43, 44, 48, and 49 are cancelled.

Claims 30-34, 36-40, 42, and 45-47 are pending and
appealed.

4.   **Status of Amendments.**

No amendment has been filed subsequent to the final
rejection dated March 4, 2004.

5.   *Summary of the Invention.*

The claimed invention is directed to a method for detecting defects, in a non-contacting manner, on shot cores and core packets used in the foundry industry. By way of background, as part of the casting of mold parts, it is conventional to first form shot cores which are formed as separate pieces and then joined together to form a casting mold or a core packet. These core packets are then filled with molten metal to cast the finished product.

Shot cores and core packets of the described type tend to have defects, especially along their edges, which are thus imparted to the cast products. The cast products require substantial cooling time before they can be measured and inspected by conventional contact procedures, and should there be a defect in a shot core or core packet, a large number of cast parts would be produced before the defect could be detected. The present invention effectively alleviates this problem by providing an efficient and reliable system for detecting defects in the shot cores or core packets before they are placed in production.

In carrying out the method of the invention, the articles being analyzed are illuminated by at least two light sources operating in sequence and emanating from different directions, and a camera, which preferably is at a fixed location, is used for recording each article and the shadows resulting from the illumination. The recorded data is processed in a computer, where the recorded image is compared with a record of reference data.

As an important feature of the claimed invention, the light sources are positioned so as to produce shadows which magnify an area of each shot core or core packet. Also, the processing of the recorded data includes processing a recorded

image which <u>includes the magnifying shadows</u>. With this arrangement, it is possible to perform a more detailed examination of critical areas of the article than could be achieved by an examination of only the article itself. This novel feature is further discussed at page 5, lines 1-15 of the specification.

6.   *Issues.*

1. Are Claims 30-34, 42, and 45 unpatentable under 35 USC 103(a) over Tabatabaei U.S. Patent No. 5,757,506 in view of Pöhlandt U.S. Patent No. 5,996,681?

2. Is Claim 36 unpatentable under 35 USC 103(a) over Tabatabaei U.S. Patent No. 5,757,506 in view of Pöhlandt U.S. Patent No. 5,996,681, and further in view of Sacks et al. U.S. Patent No. 4,736,437?

3. Are Claims 37-40, 46, and 47 unpatentable under 35 USC 103(a) over Tabatabaei U.S. Patent No. 5,757,506 in view of Pohlandt U.S. Patent No. 5,996,681, and further in view of Raviv U.S. Patent No. 4,873,651?

7.   *Grouping of Claims.*

For purposes of this appeal, the following groups of claims are considered to be separately patentable from each other and do not stand or fall together, for the reasons specified in the Argument section of this brief.

1.   Claims 30-34, 36, 37, and 42
2.   Claims 38-40
3.   Claim 45
4.   Claim 46
5.   Claim 47

8.   *Argument.*

   (a)   **The rejections based upon Tobatabaei and Pöhlandt**

   In rejecting Claims 30-34, 42, and 45 in the latest
Official Action, the Examiner has proposed a combination of
the teachings of Tabatabaei '506 and Pöhlandt '681 under §103
of the patent statute.   Tabatabaei discloses a system for the
accurate <u>positioning</u> of molds **16** with respect to the pouring
vessel **34** in a molten metal pouring operation.   To detect the
position of the molds **16**, a notch **14** is formed on the side of
each mold, and the notch is detected by an image sensor **10**
which may be a video camera or a digital image detector.
Light is provided by two light sources **18** (note Fig. 1) which
are aimed at the notches at an angle so as to cause a shadow
to be cast which provides a "dark shape representation of the
shape of the notch" (column 2, lines 44-46).   The signal from
the image sensor is converted to pixels (if not initially
provided by the sensor) and the processed signal is sent to a
central processor **22** where it is analyzed by comparing the
detected location of the notch image with a predetermined
notch location stored in a memory (column 2, lines 65-67).
The difference value is sent to a position controller **26** which
controls the movement of the pouring vessel **34**.

   The Examiner has looked to the teachings of Pöhlandt for
a teaching of a process for detecting defects in shot cores or
core packets used in the foundry industry.   Pöhlandt discloses
the use of cameras **5** to create optical images of foundry cores
3 for quality control measurements.   However, there is no
suggestion in the references themselves as to why a revision
of the mold positioning system of Tabatabaci to incorporate
the teachings of Pöhlandt would be desirable, or how such a
modification would be carried out.

   In addition, and significantly, the two references do not

teach an important feature of the present invention, even when the two references are considered collectively. Specifically, neither reference teaches or suggests the feature of using magnified shadow images of critical areas of each article which need to be carefully checked for accuracy during a quality control analysis.

In the latest Official Action the Examiner has taken the position that the shadows as disclosed by Tabatabaei would "inherently" be magnified, since the light sources are placed at an oblique angle with respect to the notch. There is no basis for this contention in the reference itself, and certainly there is no recognition in the reference of the important advantages achieved by employing such magnification as noted above. Thus it cannot be said that the magnification feature would have been taught or suggested by the reference.

Even assuming arguendo that an "inherent" magnification is present in Tabatabaei, it would necessarily be *de minimus* in the interior of the notch **14** (column 2, line 44 of the reference). Thus, in order to validate the Examiner's proposed combination, one has to further assume that the "inherent" magnification would be of sufficient magnitude to permit it to be recognized, recorded, and utilized in the defect detecting process as claimed, and there is no basis to contend that such a large number of assumptions would have been obvious to a reader of the Tabatabaei reference.

Claim 45 further defines over the cited prior art by reciting that the method includes a brightness adjustment for adapting the gray-scale values of the image. This feature is explained on page 8, lines 28-34 of the specification of the application, and is useful to compensate for differing reflectivities in the articles being tested. The Examiner has referred to Tabatabaei at column 5, lines 29-34 for a teaching

of this feature. However, the referenced portion of
Tabatabaei relates to an adjustment of the lighting threshold
in the detection algorithm to compensate for poor ambient
light. This is quite different from the purpose and function
of the brightness adjustment used in the present invention,
and this difference lends to the conclusion that the proposed
combination would not have been obvious.

For the above reasons, the proposed combination of
Tabatabaei and Pöhlandt does not teach or suggest the
invention as set forth in base Claims 30 and 45, and the
rejection of these claims should be overruled. Dependent
Claims 31-34 and 42 are allowable for the same reasons.

**b)   The rejection based upon Tabatabaei, Pöhlandt, and
Sacks**

Claim 36 stands rejected upon a proposed combination of
Tabatabaei in view of Pöhlandt, and further in view of Sachs
et al. The Sachs et al. patent does not supply the
deficiencies of Tabatabaei and Pöhlandt as set forth above,
and for purposes of this appeal, this claim will be considered
to stand or fall with base Claim 30.

**c)   The rejections based upon Tabatabaei, Pöhlandt, and
Raviv**

Claims 37-40, 46, and 47 stand rejected upon a proposed
combination of Tabatabaei and Pöhlandt, and further in view of
Raviv. Here again, the patent to Raviv does not supply the
deficiencies of Tabatabaei and Pöhlandt as set forth above,
and for purposes of this appeal, Claim 37, which recites that
the image recording step includes recording at least two
images, will be considered to stand or fall with base Claim
30.

Claims 38-40 further define over the prior art by the recitation that the image processing step includes a position correction. The position correction feature is used in association with the claimed method of detecting defects and compensates for possible translational and rotational inaccuracies of the object being tested, note page 8, lines 18-27 of the specification of the application. For a teaching of this feature, the Examiner has referred to column 3, lines 1-13 of Tabatabaei, which relates to a position correction feature which is used as part of a system for aligning the pouring vessel **34** over the mold sprue cup **38** and so as to achieve a proper pour into the mold. This is profoundly different from the purpose and function of the claimed position correction feature, and as such, there is no hint in Tabatabaei that a position correction procedure could be used to enhance a defect detecting system as claimed.

Claim 46 also stands rejected upon a proposed combination of Tabatabaei, Pöhlandt and Raviv. This claim is specific to a preferred embodiment of the present invention wherein the two lights are operated in sequence, with the resulting shadows being recorded by a camera at a fixed location, note the paragraph beginning at page 4, line 22 of the specification of the application. The Raviv patent relates a method and apparatus for reconstructing the three-dimensional surfaces of a solid object to facilitate the gripping of the object by the gripper of a robot. This is seen to be remote and non-analogous to the detection of defects in cores used in the foundry industry, and it is improbable that one looking to improve the defect detection system in the foundry industry would have considered art relating to robotics. Thus even assuming arguendo that the proposed combination of Tabatabaei and Pöhlandt is valid, the invention of Claim 46 would not

have been obvious.

The same argument applies also to Claim 47, which is directed to the use of two light sources with color differentiation. The patent to Raviv, being from non-analogous art, would not have suggested this feature even assuming that the proposed combination of Tabatabaei and Pöhlandt is valid.

CONCLUSION

For the reasons set forth above, the Examiner's final rejection of Claims 30-34, 36-40, 42, and 45-47 is legally untenable and should be reversed. Such action is solicited.
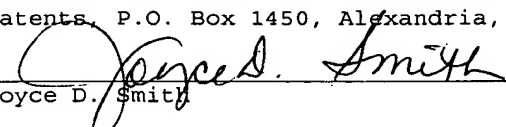
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Joyce D. Smith

APPENDIX

30. A method of detecting defects on shot cores or core packets used in the foundry industry comprising the steps of

illuminating each shot core or core packet by at least two light sources from different directions and so as to produce shadows which magnify an area of each shot core or core packet,

recording by means of a camera each illuminated shot core or core packet and the magnifying shadows resulting from the illumination to thereby produce recorded data which comprise a recorded image, and

processing the recorded data in a computer, and including processing the recorded image by comparing the recorded image with a record of reference data.

31. The method of Claim 30, wherein the camera is arranged at a fixed location.

32. The method of Claim 30, wherein the camera includes a lens and wherein the camera is encased at least in the region of the lens.

33. The method of Claim 30, wherein the processing step includes exchanging signals between the computer and a stored program control.

34. The method of claim 30, comprising the further step of performing a qualitative or quantitative image evaluation on the recorded image.

36. The method of Claim 30, wherein the comparing step includes a coarse correlation with the recorded data.

37. The method of Claim 30, wherein the recording step includes recording at least two images which are processed in the processing step.

38. The method of Claim 37, wherein the image processing step includes a position correction.

39. The method of Claim 38, wherein the position correction includes recording reference marks.

40. The method of Claim 39, wherein the reference marks are lines and/or dots on a base.

42. The method of Claim 30, wherein the image processing step comprises a defect detection.

45. A method of detecting defects on shot cores or core packets used in the foundry industry comprising the steps of
    illuminating each shot core or core packet by at least two light sources from different directions and so as to produce shadows which magnify an area of the core or core packet,
    recording by means of a camera each illuminated shot core or core packet and the magnifying shadows resulting from the illumination to thereby produce recorded data which comprise a recorded image, and
    processing the recorded data in a computer and including processing the recorded image by comparing the recorded image with a record of reference data, and
    wherein the processing step further includes a brightness adjustment for adapting the gray-scale values of the image.

46. The method of Claim 30, wherein the at least two light sources are operated in sequence.

47. The method of Claim 30, wherein the at least two light sources are operated with color differentiation.

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